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In re Applicant: Daniel Xu et al. §
Serial No.: 09/976,641 §
Filed: October 12, 2001 §
For: Reducing Leakage Currents in §
Memories With Phase-Change §
Material §
Art Unit: 2815 §
Examiner: B. Baumeister §
Atty Docket: ITO.0004US §
P12497 §

#7/Response
8/7/02
V/S

Box AF
Commissioner for Patents
Washington, DC 20231

REPLY TO FINAL REJECTION

Sir:

In response to the final office action mailed July 16, 2002, reconsideration is requested in view of the following remarks.

REMARKS

Claim 11 calls for a substrate and a buried line of a first conductivity type in the substrate. The buried line includes a pair of more lightly doped regions around a more heavily doped region.

The office action, in paragraph 2, states that "Ovshinsky discloses all the limitations of listed claims except for the presence of a lightly doped n-type region interposed between the n+ word line and the p-type substrate." Certainly no such thing is claimed in claim 11. Claim 11 calls for a substrate in a word line in the substrate. That word line must include a pair of more lightly doped regions around a more heavily doped region.

In fact, Ovshinsky discloses nothing but a word line in the substrate that consists entirely of an n+ region. Thus, there is no more lightly doped region around the more

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heavily doped region, all of which must be in the substrate. For example, the p⁺ diffusion 24, that the Examiner points to, is not part of the buried word line but is in the epitaxial layer 14. Therefore, it is not in the substrate. All that Ovshinsky shows is one out of a large number of elements; namely, a buried word line. Thus, Ovshinsky is of very little pertinency to the present invention.

Chang is even more remote. Chang does not even have anything to do with a phase change memory.

Chang teaches a p⁺ region 40 and an n⁺ region 32, but does not teach more lightly doped n-type regions on either side of the n⁺ region 32. Thus, the combination of the two references, and there is absolutely no recited rationale from within the references themselves to make the combination, still fails to meet all the claimed limitations.

The Examiner's unsupported assertion that "it would have been obvious to one of ordinary skill in the art at the time of the invention to further included additional, more lightly doped n-type regions between the n⁺ channel and the p-substrate of the Ovshinsky memory device for the purpose of reducing current leakage as taught by Chang" is without any support whatsoever. See page 3, paragraph b. There is simply no reason to provide the additional lightly doped region between the p⁺ type region and the n⁺ region in Chang. Chang provides no rationale, the Examiner points out no rationale, and there is no possible rationale set forth in the Chang patent.

Thus, the Examiner's suggestion that the Applicant has divided the references and considered them separately is of course true. But the problem is that none of the references, even together, teach all of the claimed limitations. The problem is further that there is no rationale to combine the elements for the phase change memory buried line.

The Examiner's assertion that column 4, line 10, teaches providing the intervening n-type region between the n⁺ region and the p⁺ region is without any support whatsoever. Clearly the whole suggestion of Chang is that his structure solves the leakage problem. Why then, based on Chang, would one provide an additional (unnecessary) n- region between the n⁺ region and the p⁺ region? Chang provides no answer.

Further, it should be noted that the rationale to make the modification must come from within the references itself. Clearly the rationale cannot come from Ovshinsky.

Therefore, it must come from Chang, and, if anything, Chang teaches away from the claimed invention. Chang shows a more lightly doped region for a different purpose but does not show more lightly doped regions between a p+ region and an n+ region.

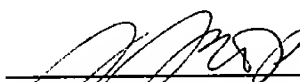
Therefore, Chang cannot teach what he never contemplated.

Therefore, reconsideration of the rejection is respectfully requested.

Respectfully requested,

Date:

7/26/02



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